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UNITED STATES DEPARTMENT OF AGRICULTURE

BUREAU OF ENTOMOLOGY

FOREST INSECT INVESTIGATIONS

SCREENING LODGEPOLE PINE TO PREVENT ATTACKS BY THE MOUNTAIN PINE BEETLE 1933-1935

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Refer to file
Studies C-1

Dr. F. C. Craighead
Washington
D. C.

Dear Doctor Craighead:

There are enclosed copies of Mr. Gibson's reports "Screening Lodgepole Pine to Prevent Attacks by the Mountain Pine Beetle, 1933-1935" and "Control of the Mountain Pine Beetle in Lodgepole Pine by Lethal Oils, 1935". Your comments and suggestions relative to these projects will of course be appreciated.

We are going to keep the screened trees under observation for the life of the adjacent infestation in order to be sure that this method of treatment offers protection. In this connection it is necessary to examine the trees prior to the period of attack in order to be sure that none of the screens have been damaged. If at all possible and a suitable location is found, we should like to treat another series of trees in this manner during the coming season. I am quite enthusiastic over this project, as I sincerely believe it offers about the only method of preserving trees of high aesthetic values.

The use of lethal oils is of course merely the testing of the experiments conducted by our California laboratory in this region. The results secured show considerable promise, and we believe that another effort should be made this season to test this method as a possible substitute for the burning-standing method of control now practiced in lodgepole pine. We should like to have Mr. Miller's suggestions relative to the continuation of this project and as to the oils which he would suggest our using.

I am sending extra copies of these reports in case you desire to route them through the offices of the Forest Service and Park Service. As the reports do not call for any control recommendations, we are sending copies direct to the Regional Foresters of Regions 1, 2, and 4.

Respectfully yours,

James C. Evenden
Entomologist

Enclosures

cc to Miller, Keen, Beal

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Respectfully submitted,

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SCREENING LODGEPOLE PINE TO PREVENT ATTACKS BY THE MOUNTAIN PINE BEETLE 1933-1935

INTRODUCTION

In the course of studying the life history and habits of the mountain pine beetle in lodgepole pine it was observed that the area of initial attack by the beetle was almost invariably in the lower part of the tree. After that portion of the tree had been successfully attacked the beetles progressively filled-in above and below to the limit of the attack.

From this habit of almost invariably initially attacking the base of the tree was evolved the theory that protecting that portion from the bark beetles might prevent the attack of any portion of the tree. In 1933 a test of the theory was made when nine green lodgepole pine were screened as follows: three to 10 feet, three to 15 feet, and three to 20 feet above the ground, using 14 mesh galvanized screening. The screen was attached to the trees in the form of a loose-fitting sleeve fastened at the top and bottom by a loop of wire twisted tightly against the bark. The seam of the sleeve was fastened by overlapping the edges and fastening them to laths, placed under and over the seam, by means of shingle nails (Figure 1). The unscreened root collar of the tree was covered with dirt until it overlapped the lower edge of the screen. To eliminate as far as possible the element of chance immunity some of the trees were screened when attacks by the

mountain pine beetle were beginning, indicating that the beetles were selecting these trees.

A few attacks by the mountain pine beetle occurred on some of these trees subsequent to screening but too few in number to overcome the tree. However, one tree was attacked by secondaries, due to the tightly stretched screen apparently contracting sufficiently to pull up the retaining wire at the tapered base of the tree. This left an opening all around the base through which enough mountain pine beetles to cause nine attacks, many ambrosia beetles, and a few other secondary insects gained entrance. Above the screen many Ips oregoni, Ips radiata, Pityogenes knechteli and other secondaries attacked the tree. The brood resulting from the mountain pine beetle attacks was in the larval stages of development.

It was felt that sufficient promise of success was indicated from the preceding trial to warrant continuing the experiment in a larger way. Accordingly in 1934 twenty-five of the larger aesthetically valuable lodgepole pine remaining around the Elkhorn Hot Springs Resort on the Beaverhead Forest were screened. These trees were enclosed to a greater height than in the previous experiment in order to give them the maximum possible protection which screening might afford. Only one tree was screened to less than 20 feet, the others averaged 22.3 with a maximum height of 30 feet. The greater the diameter of the tree the higher it was screened, because from previous studies it

had been determined that the larger trees are initially attacked at a higher point and the subsequent "fill-in" extended to a greater height than on the smaller ones.

These twenty-five trees, screened in late July of 1934, were observed to have only seven mountain pine beetle and three Ips sp. attacks when examined in late October of the same year. Five of the mountain pine beetle attacks were on one tree, twelve feet above the base and inside the screen. These insects, which had been "pitched out", are believed to have been enclosed by the screen at the time it was placed on the tree. The other two attacks were on two trees. The three Ips sp. attacks were below the screen at the base of one tree, having attacked where the earth had settled or been washed away from the lower edge of the screen.

On August 13, 1935 another tree had three mountain pine beetle attacks at the base where the protecting dirt had been washed away. A second tree from which the dirt had settled around the base had one attack by Dendroctonus murrayanae. The remaining twenty-three trees showed no additional attacks.

From the lack of attack over a two-year period it would appear that the method successfully protects lodgepole from the mountain pine beetle, but the method has not been given a fair test due to the few trees which have been killed in the Elkhorn Springs area in 1934 and 1935.

To subject the method to a more severe trial twenty-seven lodgepole pine were screened near Antelope Flat on the Targhee Forest

in the midst of a rapidly increasing infestation of the mountain pine beetle. The same method was followed, using a sleeve of galvanized screen fastened at the top and bottom with wire and earth piled around the base until it overlapped the bottom edge of the screen. The trees were screened to a height of approximately twenty feet.

In selecting these trees an effort was made to screen only those that probably would have been attacked during the current year were they not protected. The trees selected were surrounded by heavily infested trees which had been attacked in 1934 and from which the brood was about to emerge. The distance from the trees selected for screening to the nearest infested tree varied from 5 to 45 feet and averaged about 14 feet. Distance to the second nearest tree varied from 9 to 55 feet and averaged 28 feet. Screening was begun on July 17, 1935 and completed on July 19, 1935.

An examination was made of the screened trees on August 10, 1935, and no attacks were noted. However, there were only a few green-sided trees from 1934 attacks which showed any attacks for 1935, as emergence for 1935 had been very light up to that time. A second examination on September 2nd revealed one "pitched-out" attack inside the screen on one tree and another tree with one attack above the screen. No trees attacked in 1935 were observed on the area until the screened trees at the north end of the group were examined. There, the protected trees were in the midst of newly attacked trees, nine of which varied from 9 to 45 feet distant from the screened trees and twenty more were close

by. Another examination on October 5th showed the screened trees still unattacked.

Results of this experiment up to the present time indicate protection may be afforded but it is planned to leave the screen on these and the trees on the Beaverhead until the infestations have destroyed most of the marchantable timber and ceased activity on the areas, at which time definite conclusions can be drawn as to the effectiveness of the method. These three sets of trees are to be examined each year as long as the infestation is present in their vicinity.

CONCLUSION

Based on results obtained so far from the experiments on the Beaverhead and Targhee Forests, screening green lodgepole pine to a height of twenty feet prevents their attack by the mountain pine beetle. A few trees screened to a lesser height remain unattacked up to the present time but they are too few on which to draw a conclusion. It is suggested that more trees be screened to heights of ten and fifteen feet if the present experiment proves effective in order to determine the minimum amount of protected basal portion necessary to prevent attack.

In conducting this experiment there was no expectancy of adopting such a method for general control in case it proved effective but valuable trees around summer homes, resorts, and in camp grounds might

justify such means of protection during the period of an epidemic.

In studying the causes of immunity to attack which the screened trees seem to have, the growth and characteristics of nearby unscreened attacked and unattacked trees will be studied both from field notes and increment cores and compared with similar data from the screened trees at the termination of the experiment.

Figure 1

Lath used in fastening seam of screen shows as a white line.

Screening the basal portion of lodgepole pine to prevent their attack by the mountain pine beetle.